

## CLAIMS

1. A photo-catalyst containing a titanium (IV) compound comprising,  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$  or a compound represented by  $\text{MeTi(IV)O}_a\text{N}_b\text{F}_c$  prepared by doping at least one metal Me selected from the group consisting of alkali or alkaline earth metals on  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$ , wherein, b is 0.1 to 1, c is 0.1 to 1 and a is a value to maintain Ti(IV) and is decided in relation to b and c.
2. The photo-catalyst of claim 1 further comprising at least one promoter selected from the group consisting of Pt, Ni and Pd.
3. The photo-catalyst of claim 1, wherein  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$  possesses anatase structure and  $\text{MeTi(IV)O}_a\text{N}_b\text{F}_c$  possesses perovskite to anatase structure.
4. The photo-catalyst of claim 3 further comprising at least one promoter selected from the group consisting of Pt, Ni and Pd.
5. A photo-catalyst for water splitting containing a titanium (IV) compound comprising,  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$  or a compound represented by  $\text{MeTi(IV)O}_a\text{N}_b\text{F}_c$  prepared by doping at least one metal Me selected from the group consisting of alkali or alkaline earth metals on  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$ , wherein, b is 0.1 to 1, c is 0.1 to 1 and a is a value to maintain Ti(IV) and is decided in relation with b and c.
6. The photo-catalyst for water splitting of claim 5 further comprising at least one promoter selected from the group consisting of Pt, Ni, Ru and Pd.
7. The photo-catalyst for water splitting of claim 5, wherein  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$  possesses anatase structure and  $\text{MeTi(IV)O}_a\text{N}_b\text{F}_c$  possesses perovskite to anatase structure.
8. The photo-catalyst for water splitting of claim 7 further comprising at least one promoter selected from the group consisting of Pt, Ni and Pd.

9. A method for preparation of a photo-catalyst represented by  $\text{Ti(IV)O}_a\text{N}_b\text{F}_c$ , wherein  $b$  is 0.1 to 1,  $c$  is 0.1 to 1 and  $a$  is a value to maintain  $\text{Ti(IV)}$  and is decided in relation to  $b$  and  $c$ , comprising baking titanium di-ammonium fluoride halide represented by  $(\text{NH}_4)_2\text{TiF}_d\text{X}_{6-d}$ , wherein,  $d$  is 1-6, and which contains at least  $\text{F}$  and ammonium halide by the ratio of equimolar or by the ratio of slightly excess of ammonium halide, at the maximum temperature from  $200^\circ\text{C}$  to  $500^\circ\text{C}$  whereby a starting material is formed, followed by nitrogenating said starting material by thermal synthesis in ammonia atmosphere containing from 0.02% to 10.00% of oxygen, air or water to ammonia by reduced mass to oxygen atom at the maximum temperature from  $350^\circ\text{C}$  to  $700^\circ\text{C}$  for over than 5 hours.

10. (Currently amended) A method for preparation of a photo-catalyst represented by  $\text{SrTi(IV)O}_a\text{N}_b\text{F}_c$ , wherein,  $b$  is 0.1 to 1,  $c$  is 0.1 to 1 and  $a$  is a value to maintain  $\text{Ti(IV)}$  and is decided in relation to  $b$  and  $c$ , comprising baking titanium di-ammonium fluoride halide represented by  $\text{TiF}_x\text{X}_{6-x}$  and/or  $(\text{NH}_4)_2\text{TiF}_d\text{X}_{6-d}$ , wherein  $x$  and  $d$  are 1-6, and which contains at least  $\text{F}$ , and at least one compound selected from the group consisting of  $\text{SrO}$ ,  $\text{SrOH}$  and  $\text{SrX}$  so as to form a starting material or  $\text{SrTiF}_6$ , followed by nitrogenating said starting material or  $\text{SrTiF}_6$  by thermal synthesis in ammonia atmosphere containing from 0.02% to 10.00% of oxygen, air or water to ammonia by reduced mass to oxygen atom at the maximum temperature from  $350^\circ\text{C}$  to  $700^\circ\text{C}$  for over than 5 hours.